aid of vegetation. At all events nobody has ever cared to propose any other explanation of the facts, so far as the writer is aware.

As the lunation progresses the western portion of this dark area slowly fades out, while the eastern is absorbed in the gathering shadows of the lunar night.

In various parts of the crater, but especially in the south-eastern and northern portions, numerous small canals and lakes present themselves. These markings are practically identical in appearance with those seen upon the planet Mars. They are too small to be well shown in the photographs, and seem to be of much more regular structure than the larger markings, which are here also called canals. It is possible that this difference is due merely to the fact that the larger markings are better seen. A more detailed account of the phenomena here described will be found in the Harvard *Annals* (liii.).

WILLIAM H. PICKERING.

SIR LOWTHIAN BELL, BART., F.R.S.

SIR Lowthian Bell, whose death at the age of eighty-eight has already been announced, studied physical science at the University of Edinburgh and the Sorbonne at Paris, and at the age of twenty-four entered the Walker ironworks, near Newcastle. There, we learn from the obituary notice in the *Times*, he remained until 1850, when he became connected with the chemical works at Washington, in North Durham. He greatly enlarged the works and laid down extensive plant for the manufacture of an oxychloride of lead introduced as a substitute for white lead by his father-in-law, Mr. H. L. Pattinson, F.R.S., with whom he was associated in the business at Washington. There, too, was introduced in 1860 almost the first plant in England for the manufacture of aluminium by the Deville sodium process.

Soon after the discovery of the main bed of Cleveland ironstone near Middlesbrough, Sir Lowthian Bell, in conjunction with his brothers, Thomas and John, started ironworks in 1852 at Port Clarence, on the north bank of the Tees. The Clarence works was one of the earliest and is now one of the largest iron-smelting works on the Tees. About half a century ago the Tees then flooded ground where iron furnaces now stand. Sir Lowthian Bell and his brothers acquired their own ironstone mines, collieries, and limestone quarries, while they were always prompt to adopt any improvement in process or apparatus that seemed likely to be advantageous.

In the development of the Cleveland iron industry the Bell firm played a very important part, and what has been the extent of that development may be judged from the fact that whereas the district in 1850 produced less than 25,000 tons of pig iron, at the present time Middlesbrough produces about one-quarter of the total output of this country. The firm was active in prosecuting those technical studies by which processes have been devised enabling Cleveland ores to compete as raw material for the production of iron and steel with others possessing greater natural advantages. In regard to steel, the great trouble with those ores is the high percentage of phosphorus (1.8 to 2.0 per cent.) contained in the cast iron which they yield; yet Middlesbrough, largely as a result of experiments carried on under Sir Lowthian Bell's direction, at a cost, it is said, of between 40,000*l*. and 50,000*l*., produces steel rails in which this percentage is reduced to 0.07 or less.

When the British Association met at Newcastle in 1863, Sir Lowthian Bell contributed a paper on the manufacture of iron in connection with the Northumberland and Durham coalfields. In 1870 he wrote a paper on the sanitary condition of Newcastle, and more recently he compiled an elaborate account of the iron trade of the United Kingdom, compared with that of the other chief iron-making countries. On the chemistry of iron he was a high authority. The establishment of a chemical laboratory in connection with the Clarence works shows how fully he realised the importance of the scientific study of industrial processes, and his own researches on the chemistry of iron and steel have become classic. Many of these appeared first in the form of papers read before the Iron and Steel Institute, and a number of them were subsequently collected and published in a volume entitled "The Chemical Phenomena of Iron Smelting." Sir Lowthian was also the author of a book on the "Principles of the Manufacture of Iron and Steel," as well as of many papers contributed to other scientific societies.

He was one of the original founders, in 1869, of the Iron and Steel Institute, and filled the office of president from 1873 to 1875, and in 1874 became the first recipient of the gold medal instituted by Sir Henry Bessemer the year before. He was a member of the Institution of Civil Engineers and of the Chemical Society, and a past president of the Institution of Mechanical Engineers. In 1874 he was elected a fellow of the Royal Society. In recognition of his services as juror of the international exhibitions at Philadelphia in 1876, and at Paris in 1878, he was elected an honorary member of the American Philosophical Institution, and an Officer of the Legion of Honour. He was elected on the council of the Society of Arts in 1876, and in 1895 was awarded the Albert medal of the society "in recognition of the services he has rendered to arts, manufactures, and commerce by his metallurgical researches, and the resulting development of the iron and steel industries." The honour of a baronetcy was conferred on him in 1885, and in 1893 he received the degree of LL.D. from Edinburgh University.

NOTES.

A SELECTION from the specimens recently presented to the British (Natural History) Museum by His Majesty the King of Portugal has recently been placed on public exhibition in the north hall.

THE annual meetings of the American Association for the Advancement of Science and of the American Physical Society were held in Philadelphia, Pa., in "Convocation Week," from December 26, 1904, to January 2.

THE International Botanical Congress will meet at Vienna in June next, when a discussion will take place on the important question of uniformity of nomenclature, regarded both from a scientific point of view and in connection with international reports.

UNDER the title "Lichtenstein Prize," the Montpellier Academy of Sciences offers a prize for the best essay dealing with any question of zoology not referring to man. The last day is November 1, 1905. Printed memoirs more than three years old, or papers which have gained previous prizes, are excluded.

THE third International Congress of Philosophy will be held at Heidelberg in 1908. Among the English speaking members of the organising commission the name has been added of Prof. Strong, of Columbia University. A detailed account of the congress held this year at Geneva is given in a special number of the *Revue de Métaphysique et de Morale* for November, 1904.

The Postmaster-General has made provisional arrangements with the Marconi International Marine Communication Company for the acceptance and prepayment at telegraph offices in the United Kingdom of telegrams for transmission from wireless stations on the coast to ships at sea. The arrangement came into operation on January 1.

Prof. R. S. Woodward, dean of the faculty of pure science, Columbia University, has been elected president of the Carnegie Institution. Prof. C. A. Young, who has held the chair of astronomy at Princeton University since 1877, will retire at the close of the present academic year.

Captain R. F. Scott, leader of the National Antarctic Expedition, has been awarded a gold medal by the Royal Danish Geographical Society.

We learn through *Science* that Mr. Andrew Carnegie has given 108,000*l.* for the establishment in Boston of an institute similar to Cooper Institute, which is to be added to a fund of 54,000*l.*, which has grown from 1000*l.* left one hundred years ago by Benjamin Franklin.

The twenty-second annual dinner of the old students of the Royal School of Mines will be held on Thursday, February 9. The chair will be taken by Mr. T. A. Rickard. Applications for tickets should be made to Mr. D. A. Louis, 77 Shirland Gardens, London, W.

A correspondent of the *Times* states that Frédéric Mistral, the Provençal poet recently awarded 2000*l.* as half share of the Nobel prize for literature, intends to devote this sum to the development and adequate installation of the ethnographical museum—Le Musée Arletan—founded by him some years ago at Arles. For this purpose the municipal authorities agree to make over an old palace, now used as a college, the restoration and adaptation of which will cost 10,000*l.* An American resident at Avignon, Mr. Edward Leon, has offered 2000*l.* as a subscription, and will arrange for five lectures in the United States to help on the fund thus inaugurated.

The prizes for the year 1904 have been awarded, we learn from *La Nature,* by the Paris Society for the Encouragement of National Industry. The grand prix of the Marquis d'Argenteuil has been awarded to MM. Auguste and Louis Lumière for their discoveries in photography. The "chemical arts" gold medal has been awarded to M. Héroult for his works on electrometallurgy, and the "constructions and fine arts" medal to M. Arnodin. Gold medals have also been awarded to M. Boulanger for his micrographic work, to M. Grey for a rolling-mill, to M. Guillet for his work in metallurgy, and to M. Schwœrer for his system of superheated steam.

An optical convention will be held, under the presidency of Dr. R. T. Glazebrook, F.R.S., at a date toward the end of May next, at the Northampton Institute, Clerkenwell, London, E.C. The object of the convention is to bring into cooperation men interested in optical matters. A subcommittee has been appointed to consider the subjects of papers on optical questions which should be brought before the convention, and suggestions as to subjects for discussion will be welcomed. It has been decided to organise an exhibition, of a scientific character, of instruments manufactured in this country, with a view to show the progress recently made and to stimulate further efforts. In order that interest in the convention may be not confined to London workers in optics, a subcommittee is being formed to secure the assistance of local representatives. The honorary secretary of the convention is Mr. F. J. Selby, Elm Lodge, Teddington.

Writing on the subject of "Greek at Oxford," a correspondent of the *Times* again expressed the common belief that "Darwin regretted not having learnt Greek." A letter from Mr. Francis Darwin in the *Times* of December 29, 1904, shows that the statement is altogether opposed to Darwin's views. Darwin says of his education at Shrewsbury School:—"Nothing could have been worse for the development of my mind than Dr. Butler's school, as it was strictly classical, nothing else being taught, except a little ancient geography and history" ("Life and Letters," i., 31). He was, in fact, a victim of that "premature specialisation" which is generally referred to in a somewhat one-sided spirit, and from which the public schoolboy is not yet freed. Mr. Darwin adds:—"If the name of Charles Darwin is to be brought into this controversy it must not be used for compulsory Greek, but against it. In 1867 he wrote to Farrar, 'I am one of the root and branch men, and would leave classics to be learnt by those alone who have sufficient zeal and the high taste requisite for their appreciation' ('More Letters of Charles Darwin,' ii., 441)."

The Aëro Club of Paris has asked permission from the municipal authorities to make experiments in aviation in the Galerie des Machines next February. Under the head of aviation, among other experiments will be some in mechanical aërial direction. The building is so large that the results will be almost the same as would be obtained in the open air, with the difference that the disturbing effect of wind need not be feared.

St. Catherine's Lighthouse, situated on the south coast of the Isle of Wight, has just been provided with a new light of 15,000,000 candle-power, as against 3,000,000 obtained with the old apparatus. Seen from the land there are three distinct beams of light revolving in view, one just on the point of disappearing behind the "blank" or shield, while the others pass rapidly over the waters of the English Channel. The new lens is by Messrs. Chance Brothers, Birmingham; and the whole of the revolving part floats in a trough of mercury, instead of being on rollers, which has hitherto been usual, about 816 lb. of mercury being required to float it. Hitherto chain has been used in lighthouses for suspending the weights, but in this case a fine steel cable, about ¼ inch in diameter, has been adopted.

The annual report of the Russian Geographical Society gives the full list of medals awarded by the society at its annual sitting. The following medals were awarded:—the Constantine medal to the veteran geologist Friedrich Schmidt, the Count Lüthe medal to Sir John Murray, and the Semenoff gold medal to Prof. N. I. Kuznetsoff. Five small silver medals were awarded, to V. A. Vlasoff, Th. N. Panaeff, and W. M. Nedzwiedski for meteorological work, to M. M. Siazoff for the part he took in the expedition of Grum-Grzimailo, and to E. L. Byakoff for the support he gave to the same expedition.

According to information communicated by the Meteorological Observatory of Irkutsk, the earthquake which took place in Transbaikalia on September 28 last covered an area of about 4500 square miles, representing an imperfect oval elongated from N.W. to S.E., its furthest points being Troitzkosavsk in the south-east and Balagansk in the north-west. The centre of this earthquake, which was undoubtedly of tectonic origin, was located in the neighbourhood of the station Pereyemnaya, on the south-east shore of Lake Baikal. No less than three earthquakes have had their origin at this centre during the past three years.

IN the *Zoologist* for December Mr. A. H. Patterson records a number of more or less remarkable specimens of fishes captured off Great Yarmouth during the year. Several examples of flat-fish with the two sides of the same colour are recorded, a plaice of this type being further remarkable from the fact that the dorsal and anal fins united beneath the tail. In a second article Mr. G. Dalgleish directs attention to the recent migration into India of birds native of eastern Central Asia—notably the mandarin-duck.

THE October issue of the *Proceedings* of the Philadelphia Academy contains two papers devoted to the histology and early development of invertebrates. In the first Dr. J. A. Nelson discusses that puzzling creature Dinophilus, referred by some authorities to the turbellarians, and by others to the annelids. If the "trochophore" be regarded as a larval form common at least to all annelids, the development of Dinophilus cannot be considered as primitive. Rather it may be looked upon as an annelid the larval stage of which has become one towards which development tends, and which has consequently become specially modified. In the second of the two papers Mr. T. H. Montgomery gives the results of his investigations into the development and structure of the larva of the parasitic thread-worm Paragordius.

THE December issue (vol. vii., No. 2) of the *Journal* of the Marine Biological Association of the United Kingdom contains a full list of the marine invertebrate fauna of Plymouth, compiled from the records of the association. An excellent map of the Plymouth district accompanies the list, together with notes on the various dredging-grounds and their characteristic zoological products. Some of these grounds, which formerly yielded rich harvests, have been more or less completely spoiled by being made the receptacle for rubbish and refuse from the neighbouring towns. Attention is directed to the large number of species of marine organisms attacking the limestone of which the Plymouth breakwater is constructed. To such an extent, indeed, is the stone eaten into by these creatures that considerable damage is done to the structure, and constant repairs are rendered necessary.

WE have received copies of three papers by Dr. J. E. Duerden dealing with the morphology, development, and relations of corals and sea-anemones. Their titles are respectively "The Antiquity of the Zoanthid Actinians" (*Rep. Michigan Acc.*, No. 6, pp. 195–8), "Recent Results on the Morphology and Development of Coral-Polyps" (*Smithson. Miscell. Contrib.*, vol. xlvii. pp. 93–101), and "The Morphology of the Madreporaria," No. 5 (*Biol. Bull.*, vol. vii., No. 2). The main thesis of the first two papers is that, since ordinary hexamerous coral-polyps differ from sea-anemones to a great extent only by the absence of a skeleton, and the presence of such skeleton is a secondary development, the second group must be older than the first. From this basis it is argued that the tropical polyps known as zoanthids, which differ in regard to the number of their septa from the hexamerous group, bear a similar relationship to the Palæozoic tetramerous "rugose" corals, and are consequently of still more ancient origin. In the author's own words, "The Rugosa and Zoantheæ undoubtedly constitute a common group of skeleton-forming and skeletonless polyps, just as do the modern Madreporaria and ordinary hexamerous Actiniaria."

THREE papers by Dr. R. Broom on the fossil reptiles of South Africa and their relationship to mammals appear in vol. xxv., part iii., of the *Transactions* of the South African Philosophical Society. In the most important of these the author discusses the origin of the mammalian carpus and tarsus. After a brief review of the nature of these two portions of the skeleton in other groups, Dr. Broom points out that in dicynodonts and theriodonts the mammalian approximation is most marked. To quote his own words, "In these latter we find more or less approximation to the mammalian type, but if we take into consideration the extreme mammalian specialisation—the presence of a large tibiale and fibulare, with a centrale which is not in the centre but comes between the tibiale and the first tarsale, then we are driven to the conclusion that the mammalian ancestor must have been a dicynodont, a theriodont, or a form belonging to a closely allied order. From the examination of the skull we have good reason to believe that the ancestor was a theriodont, and the evidence of the tarsus fully confirms that drawn from the skull and other parts of the skeleton; and the carpus, while it does not add any very strong evidence, certainly does not afford any evidence that is not in harmony with this conclusion."

A REMARKABLE instance of what the author thinks may be true mimicry among plants is described by Dr. R. Marloth in the *Transactions* of the South African Philosophical Society, vol. xv. p. 97. Years ago, it appears that the traveller Burchell picked up on stony ground an object he mistook for a pebble, but which on exaimnation proved to be a plant of the genus Mesembrianthemum. Both in colour and in form this plant, previously named *M. truncatum*, presented a remarkable resemblance to the stones among which it grew. A second species, *M. bolusi*, growing on the hills around the Karru, generally produces two leaves about the size of a duck's egg, which have a surface like weathered stone, and a brownish grey colour tinged with green. In this state it closely resembles the surrounding stone, although for a short time its bright yellow flowers render it conspicuous enough. *M. nobile* is very similar. A fourth species of the same genus, together with *Anacampseros papyracea* (in which the leaves are covered with white papery stipules), resembles the quartz pebbles among which it grows. In the author's opinion, *M. bolusi*, *M. nobile*, and perhaps *M. truncatum* (which, unlike some of the other plants mentioned, do not change their characters under cultivation), may afford instances of true mimicry, or "homoplasy."

WE have received a report on forestry in the Transvaal by Mr. D. E. Hutchins, conservator of forests, Cape Town. The report deals with the immediate necessity for the afforestation of those large tracts of land in the colony which are unsuitable for agriculture. The importance of forestry in the Transvaal cannot be over-estimated, as a perusal of this report will show. After a tour of inspection, Mr. Hutchins has been able to indicate in his report the organisation and equipment necessary for the scheme. A list of trees suitable for cultivation in the Transvaal is given, together with short notes on their sylvicultural characteristics and uses. It may be interesting to mention that the common ash, *Fraxinus excelsior*, does not thrive in the Transvaal.

MESSRS. F. Darton and Co., St. John Street, E.C., have submitted to us a very handy and portable little instrument, the "Piesmic" barometer, invented by Mr. A. S. Davis. It consists of a glass tube about seven inches long, bent in the form of a syphon, the longer arm being of strong capillary tubing of one-tenth inch bore, the shorter arm being of thin quill tubing. The end of the longer tube opens into a small cast iron cistern, containing mercury;

when the instrument is out of action the tube lies horizontally, and the mercury lies on one side of the cistern, leaving the open end of the tube exposed to the air. When the tube is brought into a vertical position the mercury flows over and closes the mouth of the tube, and then flows down the tube to a greater or less depth, dependent upon the atmospheric pressure at the time. We have made a number of comparisons with a mercurial standard barometer, and find that its indications are correct to within about 0·12 inch. The readings, to the nearest tenth of an inch, or, by interpolation, to the hundredth of an inch, can be rapidly obtained. As a weather-glass it appears to be very useful, and even less likely to get out of order than an aneroid, but it would not be suitable for accurate scientific observations like an ordinary mercurial barometer. It has the advantage of being less costly, small in size, and easier of transport than an ordinary barometer.

We have received from Messrs. C. F. Adolph and Co., of 14 Farringdon Road, E.C., their new price list of selenium cells and apparatus. This firm has introduced a new type of selenium cell which possesses the advantage over the old form of cell that it is exposed to the light on two surfaces with a consequent increase in the sensibility of fully 75 per cent. Complete sets of apparatus for demonstrating the sensitiveness of selenium to light and the transmission of sound by means of light are also described and illustrated in the list.

In No. 21 of the *Physikalische Zeitschrift* Mr. Josef Rosenthal describes a number of improvements which he has introduced in the construction of mercury air-pumps of the Sprengel type. These pumps usually suffer from the disadvantage that the glass tube in which the mercury falls is liable to sudden fracture after the pump has been in action during a few weeks. The fracture appears to be due to the friction of the mercury on the glass producing an electrical charge which, by influencing the moist air without, converts the glass wall of the tube into the insulator of a condenser. The possibility of a discharge through the glass is eliminated by surrounding the dropping tube with a larger glass tube filled with oil, which acts as an efficient insulator. It is stated that a tube protected in this way lasted five months, although in daily use.

The *American Journal of Science* for November, 1904, contains an investigation by Mr. Bertram B. Boltwood of the radio-activity of natural waters which is of particular interest because of an attempt that is made to explain its origin. It is shown that neither hot nor cold water dissolves any appreciable quantity of radium, as such, from a mass of finely powdered uranium minerals consisting principally of uranophane, although a brief contact with these minerals is sufficient to impart to water enough of the radium emanation to produce a very marked radio-activity. Water can also acquire a measurable quantity of the radium emanation by simple contact with gaseous mixtures which contain it. It is considered that an extremely minute trace of uranium minerals in the rocks and soils through which a water percolates would be sufficient to impart to it a measurable radio-activity. But waters such as those of Bath and Baden Baden, which contain true dissolved radium, must owe the presence of the latter to a special decomposition taking place under the influence of high temperature and great pressure.

Messrs. Longmans and Co. have in the press a translation, by Mr. J. Garcin, of M. Blondlot's papers on *n*-rays communicated to the Paris Academy of Sciences. The volume will contain additional notes and instructions for the construction of phosphorescent screens.

Messrs. Macmillan and Co., Ltd., have published an edition of "An Elementary Course of Mathematics," by Messrs. H. S. Hall and F. H. Stevens, in which parts i. and ii. of the authors' "School Geometry" have been substituted for the parts of Euclid's elements contained in previous editions.

Messrs. F. Vieweg and Son, Brunswick, have issued the fifth edition of Wiedemann and Ebert's comprehensive work on practical physics—"Physikalisches Praktikum." The book contains a good systematic course of practical work in physics, the experiments being well arranged and clearly illustrated.

The issue of the *Antiquary* for January commences the first volume of a new and enlarged series. The magazine, which is devoted to the study of the past, has been enlarged by the addition of eight pages. A new section, called "At the Sign of the Owl," has been introduced, and consists of about two pages of notes concerning books of archæological interest. A good selection of articles is promised for the present year.

There has now been published at the Patent Office a subject list of works on the fine and graphic arts (including photography), and art industries, in the library of the Patent Office. The list consists of two parts—a general alphabet of subject headings, with entries in chronological order of the works arranged under these headings, and a key, or summary, to these headings shown in class order. The catalogue includes some 2916 works, representing 5373 volumes.

OUR ASTRONOMICAL COLUMN.

Another New Comet (1904 *e*).—A telegram from the Kiel Centralstelle announces the discovery of a new comet by M. Borrelly at Marseilles on December 29, 1904. The position of the object at 9h. 7m. (Marseilles M.T.) was

$$\text{R.A.} = 1\text{h. } 13\text{m. } 40\text{s., dec.} = -10^\circ\ 0',$$

and its apparent daily movement was found to be +1·6m. in R.A. and −54′ in declination. A nucleus was seen.

A further telegram states that the comet was observed by Dr. Cohn at Königsberg on December 31 at 6h. 22·2m. (Königsberg M.T.), when its position was as follows:—

$$\text{R.A.} = 1\text{h. } 15\text{m. } 56{\cdot}53\text{s., dec.} = -8^\circ\ 29'\ 59''.$$

The position of the comet is near to that of θ Ceti.

Comet 1904 *d* (Giacobini).—Further observations of comet 1904 *d* are published in No. 3986 of the *Astronomische Nachrichten*, together with Herr Ebell's elements and ephemeris. A photograph taken at the Konigstuhl Observatory, Heidelberg, on December 19d. 17h. 37·3m. (Konigstuhl M.T.) showed a short tail and a complex nucleus, whilst the position of the object for 1904·0 was

$$\text{R.A. (app.)} = 16\text{h. } 19\text{m. } 38{\cdot}8\text{s., dec. (app.)} = +28^\circ\ 23'\ 9''$$

Observations of Leonids at Harvard, 1904.—Several observers at Harvard kept the eastern part of the sky under observation for meteors from 12h. to 17h. on the night of November 14–15. As a rule, four observers kept watch, whilst a fifth wrote down their results, and between them they saw 275 meteors, of which 183 were Leonids.

The following table shows the horary rate, for a single observer, at intervals of twenty minutes:—

Nov. 14–15 h. m.	Rate	Nov. 14–15 h. m.	Rate	Nov. 14–15 h. m.	Rate
14 40	40	15 40	28	16 40	24
15 0	36	16 0	26	17 0	28
15 20	29	16 20	25		

Of the total number 35 were of the first magnitude or brighter, but none exceeded magnitude −2·0. At the moment of explosion the heads were generally blue or white, but in two cases, at least, the colour was clearly red or